

1. A pumping device, comprising:
a pumping cartridge; and
a pump chamber disposed therein; the pump chamber comprising
a wall of said pump chamber,
5 a movable surface comprising at least a portion of the wall,
at least one spacer positioned within said pump chamber to inhibit gas from being
pumped through the pump chamber, and wherein
the pumping cartridge is constructed and configured to be coupled to and removable
from a reusable component including a pump drive system for operating the pump chamber.

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2. The pump chamber of claim 1, wherein said movable surface comprises a flexible
membrane.

15 3. The pump chamber of claim 2, wherein said flexible membrane comprises an elastic
membrane.

4. The pump chamber of claim 2, wherein the removable pumping cartridge is disposable
and designed for a single use.

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5. The pump chamber of claim 4, further comprising a substantially rigid first component
having a depression therein, wherein the flexible membrane is disposed over at least a portion
of said first component such that upon coupling of the pumping cartridge with the reusable
component, the flexible membrane and said first component form an essentially fluid-tight
25 seal enclosing the pump chamber.

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6. The pump chamber of claim 5, wherein the at least one spacer comprises an elongate
protuberance having an end and a base, the base being attached within the pump chamber to
the first component such that the elongate protuberance extends towards the flexible
30 membrane.

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7. The pump chamber of claim 6, wherein the pump chamber includes a dead space to

contain a gas during operation of the pump chamber, the dead space defined as a volume within the pump chamber when the flexible membrane is displaced within the pump chamber to a maximum extent allowed by the at least one spacer.

5 8. The pump chamber of claim 6, wherein said first component includes a plurality of said spacers attached thereto, said spacers being essentially uniformly spaced apart on said first component.

10 9. The pump chamber of claim 1, wherein the pump chamber has an inlet line and an outlet line and wherein said inlet line is located at or near a top portion of the pump chamber and said outlet line is located at or near a bottom portion of the pump chamber during operation of the pump chamber.

15 10. The pump chamber of claim 9, wherein the at least one spacer assists air to rise in the pump chamber.

20 11. The pump chamber of claim 1, wherein the pump chamber comprises a volumetric container and wherein the at least one spacer is positioned within the container to inhibit contact between internal surfaces of the container.

25 12. A pump chamber, comprising:
a wall of said pump chamber;
a flexible membrane disposed over at least a portion of the wall;
at least one spacer positioned within said pump chamber to assist air to rise in the pump chamber.

30 13. A pump chamber, comprising:
a wall of said pump chamber;
a movable surface comprising at least a portion of the wall;
at least one spacer positioned within said pump chamber to inhibit gas from being pumped through the pump chamber;
an inlet line; and

an outlet line, the inlet line being connected to the pump chamber at or near a top portion of the pump chamber and the outlet line being connected to the pump chamber at or near a bottom portion of the pump chamber during operation of the pump chamber.